

PAVILLION FIELD Fremont County, Wyoming

by
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Pavillion Field is in the western Wind River Basin, about 20 miles northwest of Riverton, Wyoming, in the northeast portion of T. 3 N., R. 2 E., and the northwest portion of T. 3 N., R. 3 E. The field produces gas from sandstones in the Fort Union (Paleocene) and Wind River (Eocene) formations in a structural and structural-stratigraphic combination type trap (Fig. 1).

The discovery well, Shell Oil Company, Ora Wells No. 14-12, Section 12, T. 3 N., R. 2 E., was drilled in 1960, and completed for 1,945,000 cubic feet of gas per day from 12 feet of Fort Union sandstone, at a depth of 3,850 feet. Sinclair, Phillips, and Cities Service were participants in the discovery well.

Pavillion Field is situated on a local structural closure developed on a southeast plunging regional anticlinal fold. This regional structure is an apparent extension of, or en echelon to, the Maverick Springs-Little Dome surface anticlinal trends 15 miles to the northwest. In the Pavillion area, where Quaternary alluvium and undifferentiated upper Tertiary rocks are exposed, the subsurface structure is not expressed in surface exposures. Subsurface mapping at the Fort Union level, utilizing present well control, indicates approximately 300 feet of structural closure in the northwest portion of T. 3 N., R. 2 E. (Fig. 1). This structural closure is the primary trap for the gas accumulation; however, reservoir variations across the flanks of the structure result in gas accumulations which are in part stratigraphically controlled.

The gas productive reservoirs are lenticular sandstones derived from uplifts surrounding the Wind River Basin and deposited during Fort Union (Paleocene) and Wind River (Eocene) time. The Fort Union and Wind River formations have a combined thickness of over 5,000 feet and consist entirely of interbedded sandstone and shale. Wind River sandstones were probably transported from southwest to northeast and deposited in alluvial and lacustrine depositional environments. The variable depositional patterns of this setting make correlation of individual sandstones between wells, a mile or less apart, difficult (Fig. 2). The sandstones are generally fine to very fine grained, well sorted and contain varying interstitial clay particles of kaolinite and montmorillonite. Porosity in the sandstones ranges from 4 to 28 percent, with the variations largely attributable to the amount of

interstitial clay. The permeability also varies considerably and ranges from 0.1 to 300 millidarcies.

An average of 75 individual sandstones were penetrated in each well; of these, 6 to 20 sandstones are gas productive in each well. The remaining sandstones have limited porosity and/or permeability, or are water bearing. Individual productive sandstones vary in thickness from 3 to 69 feet and average 10 feet; net pays in the productive wells range from 36 to 144 feet.

Lateral stratigraphic variations of the reservoir sandstones across the Pavillion structure provide individual accumulations of limited lateral extent; pressure and production performance substantiate this conclusion. The most widespread and laterally continuous reservoir occurs in the basal Wind River section and pressure data suggest an interconnection of this formation.

Development drilling on 640-acre spacing has resulted in 14 gas wells and 8 dry holes. The gas-bearing sandstones range in depth from 1,300 to 4,500 feet, and produce almost 100 percent dry methane gas at initial formation pressures of 500 to 1,900 psi. Initial flow potentials are noted on the accompanying field map and cumulative production through June 1969 is 10 billion cubic feet and estimated ultimate production is 75 billion cubic feet. This study deals only with the Pavillion Field since lack of precise geologic and engineering data precludes detailed analysis of wells drilled in what is designated as Muddy Ridge Field in T. 4 N., Rs. 2, 3 E.

Initial drilling in Pavillion Field encountered numerous evaluation problems. Unconsolidated samples, lack of liquid hydrocarbons shows, and enlarged hole conditions because of water sensitive shales hampered normal evaluation techniques and mud-gas analysis. Because of fresh water and varying amounts of pore filling clays, additional problems were encountered in petrophysical evaluation with routine mechanical logs. Initial evaluations relied on drillstem and formation interval tests. Subsequently, improved drilling techniques combined with proper log selection and formation interval testing improved evaluation of development wells.

In 1964, Shell, Government No. 33X-10, Section 10, T. 3 N., R. 2 E., a 19,235-foot Madison (Mississippian) was drilled on the Pavillion structure. No production below the shallow gas sands was established in this test.

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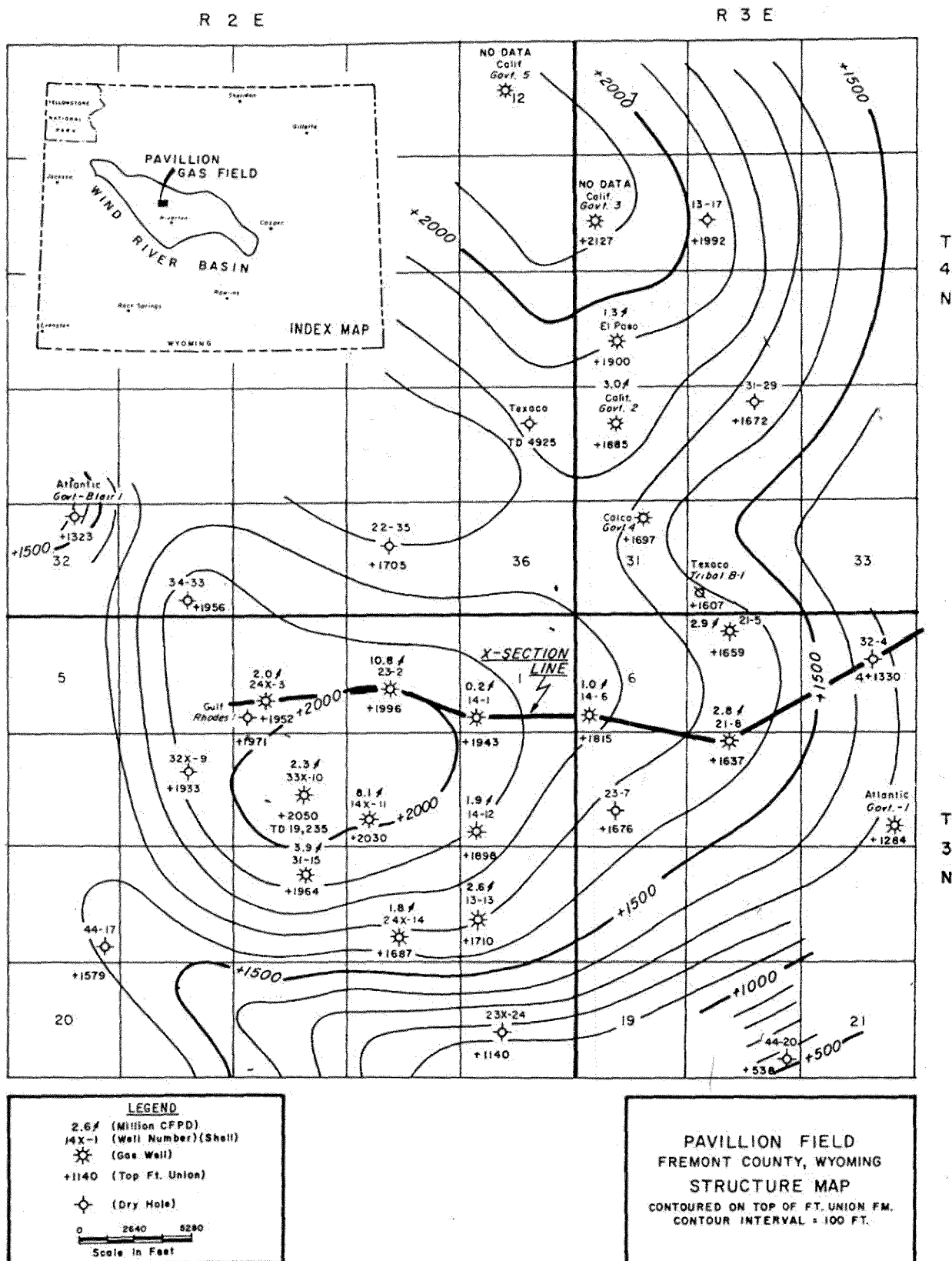


FIGURE 1

